

SEQUENCE LISTING



<110> Downs, Diana M.
Gralnick, Jeff A.

<120> Method for Preventing Superoxide Damage to Cells and
Oxygen-Labile Proteins

<130> 960296.97559

<160> 45

<170> PatentIn version 3.3

<210> 1

<211> 65

<212> PRT

<213> Artificial

<220>

<223> synthetic YggX consensus sequence

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<220>

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<223> can be any amino acid

<220>

<221> UNSURE

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<223> can be any amino acid

<400> 1

Met Xaa Arg Xaa Xaa Xaa Cys Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Pro Xaa Xaa Xaa Gly Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Trp Xaa Xaa Trp Xaa Xaa Xaa Gln Thr Xaa
35 40 45

Leu Xaa Asn Glu Xaa Xaa Leu Xaa Xaa Xaa Xaa Xaa Xaa Arg Xaa
50 55 60

Xaa

65

<210> 2

<211> 87

<212> PRT

<213> *Bordetella pertussis*

<400> 2

Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln
20 25 30

Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg
35 40 45

Leu Val Asn Glu Asn Arg 50 55 60
Leu Asn Leu Ala Asp Ala Arg Ala Arg Lys

Tyr Leu Gln Gln Gln 65 70 75 80
Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val

Glu Ala Gln Gly Tyr Val Pro
85

<210> 3
<211> 87
<212> PRT
<213> *Bordetella parapertussis*

<400> 3

Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln
20 25 30

Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg
35 40 45

Leu Val Asn Glu Asn Arg 50 55 60
Leu Asn Leu Ala Asp Ala Arg Ala Arg Lys

Tyr Leu Gln Gln Gln 65 70 75 80
Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val

Glu Ala Gln Gly Tyr Val Pro
85

<210> 4
<211> 86
<212> PRT
<213> *Bordetella bronchiseptica*

<400> 4

Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln
20 25 30

Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg

35

40

45

Leu Val Asn Glu Asn Arg Leu Asn Leu Ala Asp Ala Arg Ala Arg Lys
50 55 60

Tyr Leu Gln Gln Gln Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val
65 70 75 80

Glu Ala Gln Gly Val Pro
85

<210> 5
<211> 91
<212> PRT
<213> *Actinobacillus actinomycetemcomitans*

<400> 5

Met Ala Arg Met Val Phe Cys Glu Arg Leu Lys Gln Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp
20 25 30

Ser Ile Ser Lys Gln Ala Trp Gly Glu Trp Met Lys Lys Gln Thr Met
35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Pro Glu Ala Lys
85 90

<210> 6
<211> 87
<212> PRT
<213> *Pasteurella multocida*

<400> 6

Met Ala Arg Thr Val Phe Cys Glu Tyr Leu Lys Gln Glu Ser Glu Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp
20 25 30

Ser Ile Ser Lys Gln Ala Trp Arg Glu Trp Met Lys Lys Gln Thr Met
35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Asp His Arg Gln
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Val Pro
85

<210> 7
<211> 87
<212> PRT
<213> *Haemophilus influenzae*

<400> 7

Met Ala Arg Thr Val Phe Cys Glu Tyr Leu Lys Lys Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp
20 25 30

Ser Val Ser Lys Gln Ala Trp Gly Glu Trp Ile Lys Lys Gln Thr Met
35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Val Pro
85

<210> 8
<211> 87
<212> PRT
<213> *Haemophilus ducreyi*

<400> 8

Met Ala Arg Met Val Phe Cys Glu Tyr Leu Lys Lys Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asn
20 25 30

Ser Ile Ser Lys Gln Ala Trp Ala Glu Trp Ile Lys Lys Gln Thr Met
35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Pro Glu His Arg Gln
50 55 60

Leu Leu Glu Ala Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Asp Gly Tyr Val Pro
85

<210> 9
<211> 88
<212> PRT
<213> Shewanella putrefaciens

<400> 9

Met Ala Arg Thr Val Asn Cys Val His Leu Asn Lys Glu Ala Asp Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Asp Leu Gly Lys Arg Ile Phe Asp
20 25 30

Asn Ile Ser Lys Glu Ala Trp Gly Leu Trp Gln Lys Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Val Asp Asp Arg Lys
50 55 60

Phe Leu Glu Ala Gln Met Thr Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

Glu Ile Glu Gly Phe Val Pro Glu
85

<210> 10
<211> 90
<212> PRT
<213> Vibrio cholerae

<400> 10

Met Ala Arg Thr Val Phe Cys Thr Arg Leu Gln Lys Glu Ala Asp Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp
20 25 30

Asn Ile Cys Lys Glu Ala Trp Ala Gln Trp Gln Thr Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asp Pro Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Pro Ala Lys
85 90

<210> 11
<211> 91
<212> PRT
<213> Escherichia coli K-12 MG1655

<400> 11

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 12
<211> 91
<212> PRT
<213> Escherichia coli O157:H7EDL933

<400> 12

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn

20

25

30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 13

<211> 91

<212> PRT

<213> Escherichia coli O157:H7

<400> 13

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 14

<211> 91

<212> PRT

<213> Salmonella paratyphi

<400> 14

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 15
<211> 88
<212> PRT
<213> *Salmonella enteritidis*

<400> 15

Met Ser Pro Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu
85

<210> 16
<211> 91
<212> PRT
<213> *Salmonella dublin*
<400> 16

Met Ser Pro Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 17
<211> 91
<212> PRT
<213> *Salmonella typhi* CT18

<400> 17

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 18
<211> 91
<212> PRT
<213> *Salmonella typhimurium*

<400> 18

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Pro Thr Glu Asp Lys Lys
85 90

<210> 19
<211> 78
<212> PRT
<213> Klebsiella pneumoniae

<400> 19

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Asp Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Ser Met Met Asn Pro Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Gln Phe Leu Phe Glu Gly Lys
65 70 75

<210> 20
<211> 90
<212> PRT
<213> Yersinia pestis

<400> 20

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Lys Lys Asp Ala Glu Arg
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Ile Gly Lys Arg Ile Tyr Asn

20

25

30

Glu Ile Ser Lys Glu Ala Trp Ser Gln Trp Ile Thr Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Ser Met Met Asn Ile Glu Asp Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Gln Asp Val
65 70 75 80

His Ile Ala Gly Tyr Thr Pro Pro Ser Lys
85 90

<210> 21

<211> 76

<212> PRT

<213> Buchnera sp. APS

<400> 21

Met Asn Arg Ile Ile Phe Cys Thr Phe Phe Lys Lys Lys Ser Glu Gly
1 5 10 15

Gln Asp Phe Gln Ser Tyr Pro Gly Lys Leu Gly Lys Lys Ile Tyr Asp
20 25 30

Gln Ile Ser Lys Lys Ala Trp Glu Lys Trp Ile Glu Lys Gln Thr Ile
35 40 45

Leu Ile Asn Glu Glu Asn Leu Asn Met Phe Asn Leu Glu His Arg Lys
50 55 60

Lys Ile Glu Lys Tyr Met Lys Leu Phe Leu Phe Lys
65 70 75

<210> 22

<211> 89

<212> PRT

<213> Xylella fastidiosa

<400> 22

Met Gln Arg Ile Ile Phe Cys Glu Tyr Glu Gln Arg Asp Thr Glu Gly
1 5 10 15

Leu Asp Phe Val Pro Tyr Pro Gly Glu Leu Gly Gln Lys Ile Phe Ala
20 25 30

Cys Ile Gly Lys Val Gly Trp Ala Ala Trp Leu Val His Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Pro Arg Asn Pro Ser His Arg Ala
50 55 60

Phe Leu Glu Glu Glu Leu Asn Lys Phe Leu Phe Glu Arg Arg Val Ala
65 70 75 80

Lys Pro Glu Gly Tyr Ile Glu Pro Asp
85

<210> 23
<211> 90
<212> PRT
<213> *Pseudomonas syringae*

<400> 23

Met Thr Arg Thr Val Met Cys Arg Lys Tyr Lys Glu Glu Leu Pro Gly
1 5 10 15

Leu Glu Arg Ala Pro Tyr Pro Gly Ala Lys Gly Glu Asp Ile Phe Asn
20 25 30

His Val Ser Gln Lys Ala Trp Ala Asp Trp Gln Lys His Gln Thr Leu
35 40 45

Leu Ile Asn Glu Arg Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys
50 55 60

Phe Leu Gln Thr Glu Met Asp Lys Phe Leu Ser Gly Glu Glu Tyr Ala
65 70 75 80

Gln Ala Glu Gly Tyr Val Pro Pro Glu Lys
85 90

<210> 24
<211> 87
<212> PRT
<213> *Pseudomonas putida*

<400> 24

Met Thr Arg Thr Val Met Cys Arg Lys Tyr Gln Glu Glu Leu Pro Gly
1 5 10 15

Leu Glu Arg Pro Pro Tyr Pro Gly Ala Lys Gly Gln Asp Ile Phe Glu
20 25 30

His Ile Ser Gln Lys Ala Trp Ala Asp Trp Gln Lys His Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys
50 55 60

Phe Leu Gln Ala Glu Met Asp Lys Phe Phe Ala Gly Glu Glu Tyr Ala
65 70 75 80

Gln Ala Glu Gly Tyr Val Pro
85

<210> 25
<211> 87
<212> PRT
<213> *Pseudomonas aeruginosa*

<400> 25

Met Ser Arg Thr Val Met Cys Arg Lys Tyr His Glu Glu Leu Pro Gly
1 5 10 15

Leu Asp Arg Pro Pro Tyr Pro Gly Ala Lys Gly Glu Asp Ile Tyr Asn
20 25 30

Asn Val Ser Arg Lys Ala Trp Asp Glu Trp Gln Lys His Gln Thr Met
35 40 45

Leu Ile Asn Glu Arg Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys
50 55 60

Phe Leu Gln Gln Glu Met Asp Lys Phe Leu Ser Gly Glu Asp Tyr Ala
65 70 75 80

Lys Ala Asp Gly Tyr Val Pro
85

<210> 26
<211> 88
<212> PRT
<213> *Neisseria gonorrhoeae*

<400> 26

Met Ala Arg Met Val Phe Cys Val Lys Leu Asn Lys Glu Ala Glu Gly
1 5 10 15

Met Lys Phe Pro Pro Leu Pro Asn Glu Leu Gly Lys Arg Ile Phe Glu
20 25 30

Asn Val Ser Gln Glu Ala Trp Ala Ala Trp Thr Arg His Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Leu Ala Asp Pro Arg Ala Arg Glu
50 55 60

Tyr Leu Ala Gln Gln Met Glu Gln Tyr Phe Phe Gly Asp Gly Ala Asp
65 70 75 80

Ala Val Gln Gly Tyr Val Pro Gln
85

<210> 27
<211> 88
<212> PRT
<213> Neisseria meningitidis B

<400> 27

Met Ala Arg Met Val Phe Cys Val Lys Leu Asn Lys Glu Ala Glu Gly
1 5 10 15

Met Lys Phe Pro Pro Leu Pro Asn Glu Leu Gly Lys Arg Ile Phe Glu
20 25 30

Asn Val Ser Gln Glu Ala Trp Ala Ala Trp Thr Arg His Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Leu Ala Asp Pro Arg Ala Arg Glu
50 55 60

Tyr Leu Ala Gln Gln Met Glu Gln Tyr Phe Phe Gly Asp Gly Ala Asp
65 70 75 80

Ala Val Gln Gly Tyr Val Pro Gln
85

<210> 28
<211> 88
<212> PRT
<213> Neisseria meningitidis A

<400> 28

Met Ala Arg Met Val Phe Cys Val Lys Leu Asn Lys Glu Ala Glu Gly
1 5 10 15

Met Lys Phe Pro Pro Leu Pro Asn Glu Leu Gly Lys Arg Ile Phe Glu

20

25

30

Asn Val Ser Gln Glu Ala Trp Ala Ala Trp Thr Arg His Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Leu Ala Asp Pro Arg Ala Arg Glu
50 55 60

Tyr Leu Ala Gln Gln Met Glu Gln Tyr Phe Phe Gly Asp Gly Ala Asp
65 70 75 80

Ala Val Gln Gly Tyr Val Pro Gln
85

<210> 29

<211> 87

<212> PRT

<213> Burkholderia mallei

<400> 29

Met Ala Arg Met Ile His Cys Ala Lys Leu Gly Lys Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Pro Pro Leu Pro Gly Glu Leu Gly Lys Arg Leu Tyr Glu
20 25 30

Ser Val Ser Lys Gln Ala Trp Gln Asp Trp Leu Lys Gln Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Asn Met Ala Asp Pro Arg Ala Arg Gln
50 55 60

Tyr Leu Met Lys Gln Thr Glu Lys Tyr Phe Phe Gly Glu Gly Ala Asp
65 70 75 80

Gln Ala Ser Gly Tyr Val Pro
85

<210> 30

<211> 87

<212> PRT

<213> Burkholderia pseudomallei

<400> 30

Met Ala Arg Met Ile His Cys Ala Lys Leu Gly Lys Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Pro Pro Leu Pro Gly Glu Leu Gly Lys Arg Leu Tyr Glu
20 25 30

Ser Val Ser Lys Gln Ala Trp Gln Asp Trp Leu Lys Gln Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Asn Met Ala Asp Pro Arg Ala Arg Gln
50 55 60

Tyr Leu Met Lys Gln Thr Glu Lys Tyr Phe Phe Gly Glu Gly Ala Asp
65 70 75 80

Gln Ala Ser Gly Tyr Val Pro
85

<210> 31
<211> 87
<212> PRT
<213> Thiobacillus ferrooxidans

<400> 31

Met Ser Arg Met Val Gln Cys Val Lys Leu Gly His Glu Ala Glu Gly
1 5 10 15

Leu Asp Arg Pro Pro Tyr Pro Gly Ala Leu Gly Ala Arg Ile Tyr Gln
20 25 30

Glu Val Ser Lys Glu Ala Trp Gln Gly Trp Leu Lys His Gln Thr Met
35 40 45

Leu Ile Asn Glu Tyr Arg Leu Ser Pro Ile Asp Pro Lys Ser Arg Thr
50 55 60

Phe Leu Glu Lys Gln Met Glu Ala Tyr Phe Phe Gly Asp Gly Ala Gln
65 70 75 80

Ser Pro Glu Gly Tyr Val Pro
85

<210> 32
<211> 87
<212> PRT
<213> Methylococcus capsulatus
<400> 32

Met Ala Arg Arg Ile Ile Cys Ala Lys Leu Gly Ile Glu Ala Asp Gly
1 5 10 15

Leu Asp Ala Pro Pro Phe Pro Gly Pro Gln Gly Gln Arg Ile Phe Glu
20 25 30

His Val Ser Lys Glu Ala Trp Gln Asp Trp Leu Lys Leu Gln Thr Met
35 40 45

Leu Ile Asn Glu His Arg Leu Thr Pro Phe Glu Ala Ser Ala Arg Lys
50 55 60

Phe Leu Glu Gln Glu Arg Glu Lys Phe Leu Phe Gly Gly Thr Ser
65 70 75 80

Thr Pro Gln Gly Tyr Val Pro
85

<210> 33
<211> 88
<212> PRT
<213> *Coxiella burnetii*

<400> 33

Met Thr Arg Arg Ile Ile Cys Gln Lys Leu Gly Lys Glu Ala Asp Ala
1 5 10 15

Leu Asn Tyr Ser Pro Tyr Pro Gly Glu Leu Gly Glu Arg Ile Tyr Asn
20 25 30

His Ile Ser Glu Gln Ala Trp Gln Ala Trp Leu Ser His Gln Thr Met
35 40 45

Leu Ile Asn Glu Tyr Arg Leu Ser Leu Ile Asp Pro Lys Ala Arg Gln
50 55 60

Phe Leu Glu Gln Glu Met Ile Asn Phe Leu Phe Gly Thr Gly Ser Glu
65 70 75 80

Lys Pro Ala Gly Tyr Thr Ser Glu
85

<210> 34
<211> 91
<212> PRT
<213> *Salmonella typhimurium*

<400> 34

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 35
<211> 91
<212> PRT
<213> *Salmonella typhi*

<400> 35

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 36
<211> 91
<212> PRT
<213> *Escherichia coli*

<400> 36

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly

1

5

10

15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys
85 90

<210> 37

<211> 90

<212> PRT

<213> Yersinia pestis

<400> 37

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Lys Lys Asp Ala Glu Arg
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Ile Gly Lys Arg Ile Tyr Asn
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ser Gln Trp Ile Thr Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Ser Met Met Asn Ile Glu Asp Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Gln Asp Val
65 70 75 80

His Ile Ala Gly Tyr Thr Pro Pro Ser Lys
85 90

<210> 38

<211> 87

<212> PRT

<213> Haemophilus influenzae

<400> 38

Met Ala Arg Thr Val Phe Cys Glu Tyr Leu Lys Lys Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp
20 25 30

Ser Val Ser Lys Gln Ala Trp Gly Glu Trp Ile Lys Lys Gln Thr Met
35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

His Ile Glu Gly Tyr Val Pro
85

<210> 39
<211> 88
<212> PRT
<213> *Shewanella putrefaciens*

<400> 39

Met Ala Arg Thr Val Asn Cys Val His Leu Asn Lys Glu Ala Asp Gly
1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Asp Leu Gly Lys Arg Ile Phe Asp
20 25 30

Asn Ile Ser Lys Glu Ala Trp Gly Leu Trp Gln Lys Lys Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Val Asp Asp Arg Lys
50 55 60

Phe Leu Glu Ala Gln Met Thr Ser Phe Leu Phe Glu Gly Lys Asp Val
65 70 75 80

Glu Ile Glu Gly Phe Val Pro Glu
85

<210> 40
<211> 87
<212> PRT
<213> *Pseudomonas aeruginosa*

<400> 40

Met Ser Arg Thr Val Met Cys Arg Lys Tyr His Glu Glu Leu Pro Gly
1 5 10 15

Leu Asp Arg Pro Pro Tyr Pro Gly Ala Lys Gly Glu Asp Ile Tyr Asn
20 25 30

Asn Val Ser Arg Lys Ala Trp Asp Glu Trp Gln Lys His Gln Thr Met
35 40 45

Leu Ile Asn Glu Arg Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys
50 55 60

Phe Leu Gln Gln Glu Met Asp Lys Phe Leu Ser Gly Glu Asp Tyr Ala
65 70 75 80

Lys Ala Asp Gly Tyr Val Pro
85

<210> 41
<211> 87
<212> PRT
<213> *Pseudomonas putida*

<400> 41

Met Thr Arg Thr Val Met Cys Arg Lys Tyr Gln Glu Glu Leu Pro Gly
1 5 10 15

Leu Glu Arg Pro Pro Tyr Pro Gly Ala Lys Gly Gln Asp Ile Phe Glu
20 25 30

His Ile Ser Gln Lys Ala Trp Ala Asp Trp Gln Lys His Gln Thr Met
35 40 45

Leu Ile Asn Glu Lys Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys
50 55 60

Phe Leu Gln Ala Glu Met Asp Lys Phe Phe Ala Gly Glu Glu Tyr Ala
65 70 75 80

Gln Ala Glu Gly Tyr Val Pro
85

<210> 42
<211> 88
<212> PRT
<213> *Neisseria gonorrhoeae*

<400> 42

Met Ala Arg Met Val Phe Cys Val Lys Leu Asn Lys Glu Ala Glu Gly
1 5 10 15

Met Lys Phe Pro Pro Leu Pro Asn Glu Leu Gly Lys Arg Ile Phe Glu
20 25 30

Asn Val Ser Gln Glu Ala Trp Ala Ala Trp Thr Arg His Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Leu Ala Asp Pro Arg Ala Arg Glu
50 55 60

Tyr Leu Ala Gln Gln Met Glu Gln Tyr Phe Phe Gly Asp Gly Ala Asp
65 70 75 80

Ala Val Gln Gly Tyr Val Pro Gln
85

<210> 43

<211> 87

<212> PRT

<213> Thiobacillus ferrooxidans

<400> 43

Met Ser Arg Met Val Gln Cys Val Lys Leu Gly His Glu Ala Glu Gly
1 5 10 15

Leu Asp Arg Pro Pro Tyr Pro Gly Ala Leu Gly Ala Arg Ile Tyr Gln
20 25 30

Glu Val Ser Lys Glu Ala Trp Gln Gly Trp Leu Lys His Gln Thr Met
35 40 45

Leu Ile Asn Glu Tyr Arg Leu Ser Pro Ile Asp Pro Lys Ser Arg Thr
50 55 60

Phe Leu Glu Lys Gln Met Glu Ala Tyr Phe Phe Gly Asp Gly Ala Gln
65 70 75 80

Ser Pro Glu Gly Tyr Val Pro
85

<210> 44

<211> 84

<212> PRT

<213> Bordetella bronchiseptica

<400> 44

Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly
1 5 10 15

Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln
20 25 30

Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg
35 40 45

Leu Val Asn Glu Asn Arg Leu Asn Pro Ala Asp Ala Arg Ala Arg Lys
50 55 60

Tyr Leu Gln Gln Gln Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val
65 70 75 80

Glu Ala Gln Gly

<210> 45

<211> 89

<212> PRT

<213> *Xylella fastidiosa*

<400> 45

Met Gln Arg Ile Ile Phe Cys Glu Tyr Glu Gln Arg Asp Thr Glu Gly
1 5 10 15

Leu Asp Phe Val Pro Tyr Pro Gly Glu Leu Gly Gln Lys Ile Phe Ala
20 25 30

Cys Ile Gly Lys Val Gly Trp Ala Ala Trp Leu Val His Gln Thr Met
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Pro Arg Asn Pro Ser His Arg Ala
50 55 60

Phe Leu Glu Glu Glu Leu Asn Lys Phe Leu Phe Glu Arg Arg Val Ala
65 70 75 80

Lys Pro Glu Gly Tyr Ile Glu Pro Asp
85